

## **REMARKS**

### **I. Status of the Claims**

Claims 1 – 9, 15, and 17 are currently pending in the present application. Claims 1 and 8 are independent. Claims 10 – 14 and 16 were previously canceled. Claims 1 and 8 have been amended. Support for this amendment may be found in at least FIG. 8 and in paragraphs [0011], [0016], and [0065] of the application as published. No new matter has been added.

Although a Notice of Appeal was filed on October 19, 2010, the Applicant is aware that the present filing terminates the appeal.

Claims 1 – 9, 15, and 17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent Application Publication No. 2003/0118876 (“Sugiura”).

The Applicant respectfully requests reconsideration of the above rejections in view of the foregoing amendments and the following remarks.

### **II. Remarks Regarding the § 103 Rejection**

Independent claims 1 and 8 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Sugiura.

The Applicant respectfully submits that claim 1 is patentable over the cited references at least because it recites, in part, “a threshold value adjusting device for adjusting a reference value according to an internal electromotive voltage of the fuel cell, such that *the reference value decreases as the internal electromotive voltage of the fuel cell, when stopped, decreases*” (emphasis added).

The Applicant respectfully submits that claim 8 is patentable over the cited references at least because it recites, in part, “wherein the reference value is adjusted by a threshold value adjusting device that adjusts the reference value according to an internal electromotive voltage of the fuel cell, such that *the reference value decreases as the internal electromotive voltage of the fuel cell, when stopped, decreases*” (emphasis added).

Sugiura fails to teach adjusting a reference value such that the reference value decreases as fuel cell voltage output decreases, the fuel cell being stopped at the time.

Nevertheless, the Office Action asserts that Sugiura renders claims 1 and 8 of the present application obvious. As discussed in *KSR Int'l Co. v. Teleflex Inc.*, it remains necessary to identify the reason why a person of ordinary skill in the art would have been prompted to combine alleged prior art elements in the manner as claimed. 550 U.S. 398, 418 (2007). Mere conclusory statements are insufficient. *Id.*; M.P.E.P. § 2143.01(IV).

One example of a fuel cell system in accordance with claims 1 and 8 of the present application includes a fuel cell, an electric power storing device (such as a secondary battery), and an electric power supplying device for supplying power from the fuel cell and storing device to a load. In order to operate the fuel cell as efficiently as possible, the system supplies power in either an intermittent mode or a continuous mode. In the continuous mode, the fuel cell (and, in certain circumstances, also the power storing device) supplies power to the load. In intermittent mode, only the power storing device supplies power.

A system in accordance with these claims also provides a control device for determining when the system should switch between intermittent and continuous modes. For example, the control device may dictate that the system will operate in intermittent mode (*i.e.* only the storing device supplies power) when the amount of power required by the load is less than a reference value. Otherwise, the system will operate in continuous mode, and the fuel cell supplies power.

The above reference value may be a minimum value for efficient operation of a fuel cell. In other words, a fuel cell operating below this value would no longer be operating efficiently. In such cases, it is desirable to operate in intermittent mode. However, this efficiency point changes during operation of the fuel cell. Noting that one such factor is the output voltage of the fuel cell, the present inventors designed a system that effectively determines when to switch operating modes.

In order to determine an appropriate reference value more effectively, the system recited by claims 1 and 8 of the present application provides a threshold value adjusting device. This device alters the reference value based on the internal electromotive voltage of the fuel cell. As shown in Figure A below, this exemplary device increases the reference (*i.e.* threshold) value as

the voltage of the fuel cell increases.

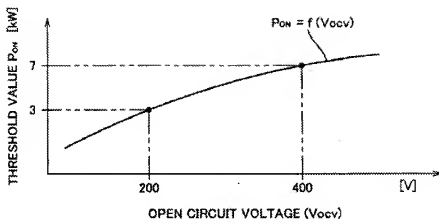


Figure A: FIG. 8 of the Published Application

Sugiura, on the other hand, discloses a power supply apparatus having a fuel cell and a capacitor. The apparatus also includes fuel cell mode determination means for determining when to operate in an “FC suspended mode” or a normal mode in which only the fuel cell supplies power. Sugiura’s determination means measures a voltage from the capacitor and compares this with a reference voltage. Based on this comparison, the determination means either opens or closes switches that connect the fuel cell to a load. As shown in Figure B below, Sugiura teaches altering the reference voltage based on the rate of increase of the voltage of the capacitor ( $dV_c/dt$ ). As shown in Figure B below and described in paragraph [0081] of Sugiura, the reference voltage increases as the capacitor voltage rate decreases.

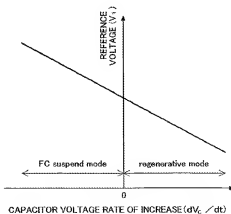


Figure B: FIG. 8 of Sugiura

Sugiura considers the increasing rate (*i.e.* the rate of change) of capacitor voltage in order to restart the fuel cell with less consumption of electric power. This is achieved by setting a larger reference voltage as the rate of increase of the capacitor voltage is smaller and (therefore) the consumption of power changes drastically. (This is described in paragraph [0091] of Sugiura.) However, when the fuel cell is stopped (as in the present invention), the consumption amount of electric power cannot be calculated even though the internal electromotive voltage of the fuel cell may be known. Therefore, one of skill in the art would not have found it obvious to change the reference value based on the internal electromotive voltage of a fuel cell based on a reading of Sugiura.

The Office Action attempts to show a relationship between the rate of increase of capacitor voltage and the internal electromotive voltage of the fuel cell by using the relationship between  $dP_v/dt$  and  $dP_c/dt$ . (Office Action at 4, 6.) However, in the inventions recited by claims 1 and 8 of the present application, the fuel cell is stopped. Thus, the above-described relationship cannot be available when the fuel cell is stopped, even though such a relationship may be available when the fuel cell is activated. This is because  $dP_v/dt$  is not affected even though  $dP_c/dt$  changes while the cell is stopped.

In other words, one could apply the capacitor of Sugiura to a fuel cell only when a change of voltage of the fuel cell could change in the same way of the change of voltage of the capacitor. However, in the inventions of claims 1 and 8 of the present application, the internal electromotive voltage of the fuel cell when the fuel cell is in a stopped state is not affected by a change of the external electric power consumption.

Accordingly, claims 1 and 8 have been amended to highlight the above distinctions. Specifically, these claims have been amended to recite that the reference value decreases as the internal electromotive force of the fuel cell, *which is stopped at the time*, decreases.

For at least these reasons, the § 103 rejection of the independent claims is improper. Specifically, Sugiura fails to teach adjusting a reference value such that the reference value decreases as fuel cell voltage (*not* rate of change of voltage) decreases, the fuel cell being stopped at the time. For at least these reasons, the Applicant respectfully requests withdrawal of the § 103 rejection of claims 1, 8, and all claims depending therefrom.

**CONCLUSION**

In light of the above remarks, the Applicants respectfully submit that the present application is in condition for allowance. The Applicants earnestly solicit favorable reconsideration and issuance of a Notice of Allowance.

The Examiner is invited to contact the undersigned at (202) 220-4420 to discuss any matter concerning this application. **The Office is authorized to charge any fees related to this communication to Deposit Account No. 11-0600.**

Respectfully submitted,

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